

## **REMARKS**

Applicant is in receipt of the Office Action mailed August 11, 2003. The Abstract was amended to comply with the 150 word limit. Claims 1-44 are pending in the current case. Further consideration of the present case is respectfully requested in light of the following remarks.

### **Section 102 Rejections**

Claims 1-3, 6, 8, 14-16, 19, 20, 35, 36, 41, and 42 were rejected under 35 U.S.C. 102(e) as being anticipated by Marchok et al. (U.S. Patent No. 6,122,246, "Marchok").

Claim 1 recites:

1. A method for determining one or more signal parameters for a tone in an input signal, the method comprising:

receiving samples of the input signal, wherein the input signal includes the tone;

generating a frequency transform of the samples;

identifying a frequency location proximate to an amplitude peak in the frequency transform, wherein the amplitude peak corresponds to the tone;

selecting two or more frequency bins proximate to the frequency location in the frequency transform; and

determining a tone frequency value that minimizes a difference between at least a first expression and a second expression;

wherein the first expression comprises a sum of two or more numerator terms divided by a sum of two or more denominator terms, wherein the first expression includes a tone frequency variable;

wherein each numerator term and each denominator term corresponds to one of the frequency bins; and

wherein the second expression comprises a sum of one or more of the numerator terms divided by a sum of one or more of the denominator terms, wherein the second expression includes the tone frequency variable;

wherein the tone frequency value comprises a frequency of the tone.

The Office Action asserts that Marchok discloses all of the limitations recited above in claim 1. Applicant respectfully disagrees.

Marchok discloses a method for communication between a transmitter and a receiver using OFEM/DMT symbols, where symbols are transmitted on various carrier frequencies, and where a receiver uses a phase-locked loop to extract or otherwise identify the symbols from the carrier frequencies (Abstract). Applicant submits that Marchok does not teach or suggest computing an estimate of a tone.

For example, the Office Action asserts that Marchok describes determining a tone frequency value that minimized a difference between at least a first expression and a second expression, citing column 6, lines 6-23 of Marchok. However, the cited passage describes determining an error or difference between a demodulated sub-symbol and a known value (i.e., a known sub-symbol), or between an un-sliced sub-symbol and a sliced sub-symbol, and using the determined error or difference to adjust timing of an output of a voltage controlled oscillator to facilitate phase locked loop processing of the signal. In other words, the errors or differences are used to phase lock the signal for symbol extraction, not to compute an estimate of the frequency of the signal.

Applicant submits that in Marchok's system, the receiver determines a frequency bin containing a pilot tone (reference clock signal), where the pilot tone has a frequency corresponding to signal output from a voltage controlled oscillator of the transmitter, and that the determined error or difference is used to phase lock the signal within the frequency range of the bin, i.e., to adjust a voltage controlled oscillator for synchrony with the transmitted signal. As Marchok describes in column 5, line 54 through column 6 line 1:

"The entire pilot tone acquisition procedure can be viewed as a two stage process comprising search and acquisition of the pilot tone. To this end, the receiver 150 operates in accordance with at least two modes of operation. In a first pilot tone search mode of operation, the receiver scans the frequency range of the bins transmitted by the transmitter 97 in predetermined frequency steps looking for the bin containing the pilot tone. Once the bin containing the pilot tone sub-symbol has been identified, the receiver 150 makes a gross timing adjustment of the output signal of voltage controlled oscillator 240 to receive the bin including the

pilot tone sub-symbol in the correct predetermined bin location. In a subsequently occurring second pilot tone acquisition mode, the receiver 150 also measures the phase difference between consecutive pilot tone sub-symbols to adjust the timing of the output of the voltage controlled oscillator 240 so that it is within a frequency range sufficient for subsequent phase locked loop processing of the pilot tone signal.”

In other words, an estimated value of the frequency is not determined, but rather, a frequency bin is determined, then an oscillator is brought into near enough synchrony with the signal for phase locked loop processing of the signal to be performed.

The Office Action further asserts that Marchok discloses “wherein the first expression comprises a sum of two or more numerator terms divided by a sum of two or more denominator terms, wherein the first expression includes a tone frequency variable; wherein each numerator term and each denominator term corresponds to one of the frequency bins; wherein the second expression comprises a sum of one or more of the numerator terms divided by a sum of one or more of the denominator terms, wherein the second expression includes the tone frequency variable; wherein the tone frequency value comprises a frequency of the tone”, citing column 9, lines 25-40 and lines 7-13, column 10 lines 5-7 and lines 39-41, column 3, line 53, and column 5, lines 28-33.

Applicant submits that the expressions of column 9, lines 25-40 comprise respective average power and coherence computations over all the bins and all the symbols, and specifically do not meet the limitations of claim 1. Applicant further submits that the expression of column 10, lines 5-7 is a normalized correlation metric based on the correlation and average power of the signal and is used to determine a frequency bin for the pilot tone signal. Applicant notes that none of the expressions of columns 9 or 10 include a tone frequency variable.

Applicant disagrees with the reference to column 3, line 53, in that the cited phrase merely refers to the fact that each symbol is transmitted at a given carrier frequency or bin. As Marchok states in column 7, lines 23-25, “for exemplary purposes, it will be assumed that the system employs a bin width of 9.615 KHz, and uses a pilot tone bin that is located as the 12<sup>th</sup> bin in a total receive window of 26 bins.” Thus, a bin comprises a substantial range of frequencies, and is specifically not a particular frequency.

Thus, Applicant respectfully submits that Marchok neither teaches nor suggests the limitations cited in claim 1, and this claim 1 is patentably distinct over Marchok for at least the reasons provided above, as are claims dependent thereon. Similarly, since independent claims 19, 23, 35, 40, and 41 each substantially include the limitations of claim 1, Applicant respectfully submits that these claims, as well as claims respectively dependent thereon, are also patentably distinct over Marchok for at least the reasons provided above.

### **Section 103 Rejections**

Claims 4, 12, 13, 22, and 43 were rejected under 35 U.S.C. 103(a) as being unpatentable over Marchok in view of Cox (U.S. Patent No. 3,571,522, "Cox").

Regarding claims 4 and 43, the Office Action asserts that Marchok teaches all the features of the claimed invention except that a ratio of each numerator and its corresponding denominator term represent an amplitude of the tone, but that Cox teaches that a ratio of each numerator and its corresponding denominator term represent an amplitude of the tone, citing column 4, lines 65-69, and that it would have been obvious to one of ordinary skill in the art to modify Marchok to include the teachings of Cox to produce the limitations of claims 4 and 43. Applicant respectfully disagrees.

As presented above, Applicant respectfully submits that Marchok does not teach numerous features of the claimed invention. Applicant further submits that Cox does not teach that a ratio of each numerator and its corresponding denominator term represent an amplitude of the tone. As Cox states in column 4, lines 66-69, "The asymmetry signal may be expressed as the ratio  $E_p/A$  where  $A$  is the peak amplitude of an incoming tone", where  $E_p$  is the maximum permissible asymmetry of the signal (column 4, lines 63-64). In other words, the denominator in the ratio is the peak amplitude of the tone, but the ratio itself is not. Thus, the cited ratio specifically does not represent the amplitude of the tone.

Thus, Applicant submits that neither Marchok nor Cox, either singly or in combination, teaches the limitations of claims 4 and 43. Thus, for at least the reasons provided above, Applicant respectfully submits that claims 4 and 43 are patentably distinct over Marchok in view of Cox.

Regarding claims 12 and 22, the Office Action asserts that Marchok teaches all the features of the claimed invention except for storing the determined tone frequency value in a memory, but that Cox teaches storing the determined tone frequency value in a memory, citing Cox, column 4, lines 72-75, and that it would have been obvious to one of ordinary skill in the art to modify the teachings of Marchok to include the teachings of Cox to produce the limitations of claims 12 and 22. Applicant respectfully disagrees.

As presented above, Applicant respectfully submits that Marchok does not teach numerous features of the claimed invention. Applicant further submits that Cox does not teach storing the determined tone frequency value. In column 4, lines 72-75, Cox describes storing “the maximum error signal from amplifier 216.”, as well as storing “the peak amplitude of the incoming signal.” Nowhere does Cox teach or suggest storing a determined tone frequency value in a memory. Similarly, Applicant submits that Cox does not describe outputting the determined tone frequency value, but rather describes the amplifier outputting the maximum error signal (column 4, line 75 – column 5, line 3).

Thus, Applicant submits that neither Marchok nor Cox, either singly or in combination, teaches the limitations of claims 12, 13, and 22. Thus, for at least the reasons provided above, Applicant respectfully submits that claims 12, 13, and 22 are patentably distinct over Marchok in view of Cox.

The Office Action rejected claim 7 under 35 U.S.C. 103(a) as being unpatentable over Marchok in view of Roth (U.S. Patent No. 5,617,491, “Roth”).

The Office Action asserts that Marchok teaches all the features of the claimed invention except for performing a Newton-Rhapson root finding method, but that Roth teaches computing a plurality of differences by performing a Newton-Rhapson root finding method, citing Roth, column 8, lines 4-16, and that it would have been obvious to

one of ordinary skill in the art to modify the teachings of Marchok to include the teachings of Roth to produce the limitations of claim 7. Applicant respectfully disagrees.

As presented above, Applicant respectfully submits that Marchok does not teach numerous features of the claimed invention. Thus, Applicant submits that neither Marchok nor Roth, either singly or in combination, teaches the limitations of claim 7. Thus, for at least the reasons provided above, Applicant respectfully submits that claim 7 is patentably distinct over Marchok in view of Roth.

The Office Action rejected claims 17 and 18 under 35 U.S.C. 103(a) as being unpatentable over Marchok in view of Barazesh et al. (U.S. Patent No. 6,128,370, “Barazesh”).

The Office Action asserts that Marchok teaches all the features of the claimed invention except that the input signal comprises a plurality of tones; and wherein the method operates to find signal parameters of a first tone of the plurality of tones, but that Barazesh teaches that the input signal comprises a plurality of tones, citing Barazesh, column 4, lines 57-64, and that it would have been obvious to one of ordinary skill in the art to modify the teachings of Marchok to include the teachings of Barazesh to produce the limitations of claim 17. Applicant respectfully disagrees.

As presented above, Applicant respectfully submits that Marchok does not teach numerous features of the claimed invention. Applicant further submits that in the system of Barazesh, the frequencies of the two tones are known beforehand, and that the energies of the signal at the known frequencies are measured to determine whether the tones are present. In other words, Barazesh teaches detection of energy levels at known frequencies, and specifically does not teach determining the frequency values of the tones. Thus, Applicant submits that neither Marchok nor Barazesh, either singly or in combination, teaches the limitations of claim 17. Thus, for at least the reasons provided above, Applicant respectfully submits that claim 17 is patentably distinct over Marchok in view of Barazesh.

The Office Action further asserts that Marchok teaches all the features of the claimed invention except for determining at least one signal parameter for each of the

plurality of tones in the input signal, but that Barazesh teaches determining at least one signal parameter for each of the plurality of tones in the input signal, citing Barazesh, column 4, lines 65-column 5, line 10, and that it would have been obvious to one of ordinary skill in the art to modify the teachings of Marchok to include the teachings of Barazesh to produce the limitations of claim 18. Applicant respectfully disagrees.

As presented above, Applicant respectfully submits that Marchok does not teach numerous features of the claimed invention. Thus, Applicant submits that neither Marchok nor Barazesh, either singly or in combination, teaches the limitations of claim 18. Thus, for at least the reasons provided above, Applicant respectfully submits that claim 18 is patentably distinct over Marchok in view of Barazesh.

## CONCLUSION

The Abstract was amended to comply with the 150 word limit. Rejection of claims 1-3, 6, 8, 14-16, 19, 20, 35, 36, 41, and 42 under 35 U.S.C. 102(e) and rejection of claims 4, 7, 12, 13, 17, 18, 22, and 43 under 35 U.S.C. § 103(a) have been responded to. This response, therefore, constitutes a complete response to all issues raised in the Office Action mailed August 11, 2003. In view of the remarks traversing the rejections presented in the Office Action, pending claims 1-44 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference. Applicant submits the application is in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert & Goetzel PC Deposit Account No. 50-1505/5150-54700/JCH.

Also enclosed herewith are the following items:

☒ Return Receipt Postcard

Respectfully submitted,



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